

REMARKS

Claims 1-15 currently appear in this application. The Office Action of December 5, 2006, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicant respectfully requests favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

What is Claimed

Claims 6, 7, 10, 11, 14 and 15 have been amended to recite a step of injecting the high pullulan liquid of claim 1 into a member selected from the group consisting of various shapes and volumes of containers; tanks; containers loaded or equipped on trains, ships, airplanes, trucks and truck tanks. Support for these amendments can be found in the specification as filed at page 11, lines 19-22.

As the specification at pages 1-3 described in the "Background Art", all pullulan products obtained by conventional methods are in the form of a powder or film, i.e., a solid pullulan. The only available pullulan products at the time the present application was filed were in solid

form. There had not previously been available a liquid form of pullulan products.

The reason pullulan products had heretofore not been commercially available was that liquid pullulan products have been recognized to be susceptible to microbial pollution and change in pH and viscosity, and therefore actual use of such liquid pullulan products has been deemed to be impossible. Additionally, commercialization of liquid pullulan products had been recognized to be impossible because the viscosity of liquid pullulan products logarithmically proportionally increases with increase in pullulan concentration.

Moreover, demand for liquid pullulan products, particularly liquids having a high proportion of pullulan, has increased lately in the fields of food products, health foods, cosmetics, pharmaceuticals, chemicals, agriculture, forestry and fishery. Under these circumstances, users requiring liquid pullulan products were forced to purchase solid pullulan products, and then had to dissolve them in appropriate solvents in order to obtain liquid pullulan. Of course, dissolving the solid pullulan in an appropriate solvent requires time, labor and energy. Furthermore, solid pullulan products, in particular pullulan powder, have other disadvantages, in that they tend to form "mamako or dama"

(coagulation of powder of pullulan), and bubbles are readily incorporated into the suspensions formed. Consequently, thus obtained liquid pullulan having a pullulan concentration of about 10 to 15% (w/w) tends to be inhomogeneous, even when prepared with heat. Heating pullulan, however, causes a molecular reduction of pullulan that is accompanied by a reduction of the viscosity of the liquid pullulan products.

In view of the various disadvantages of conventional solid pullulan products, the invention claimed herein provides a pullulan product in liquid in form, particularly, a high pullulan product in liquid form, as well as a method for transporting liquid pullulan products having a high concentration of pullulan.

Art Rejections

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al., U.S. 3,912,591. The Examiner alleges that Kato discloses a high pullulan content liquid prepared from bacterial culture medium, which has a final pH of 4.7 and containing pullulan of molecular weight 180,000, produced in a yield of 71%. The Examiner further alleges that Kato discloses that adjusting the pH of the culture medium controls the yield and degree of polymerization of the pullulan produced, and further that the pullulan of low

molecular weight can be readily purified and converted to products of low viscosity or to maltotriose, and furthermore, that the bacteriostat ethanol can be added to the culture medium.

Accordingly, the Examiner asserts that it would have been obvious to one of ordinary skill in the art, at the time the claimed invention was made, to have prepared the pullulan composition of Kato and to determine the bacterial count and specific % of the pullulan in the composition to produced a purified product of low viscosity such as maltotriose, depending on the need and availability.

This rejection is respectfully traversed. First of all, Kato only discloses a process for producing pullulan in high yield. The pullulan product obtained in Kato is not in a liquid form, but is in a solid and dried form, as shown in Example 1 in columns 3-4 of Kato. There is nothing in Kato regarding providing either a liquid having a high concentration of pullulan or a method for transporting this liquid of high pullulan content with low energy costs and less equipment than has conventionally been required.

In the process disclosed by Kato, the pullulan is temporarily in a liquid form in the culture medium. However, pullulan in a culture medium is not a pullulan product. A

pullulan product is only obtained from pullulan in a culture medium by precipitating the pullulan in methanol, then centrifuging, washing, and drying the pullulan in a vacuum. Pullulan in a liquid form that is in a culture medium is not a pullulan product.

In contrast to the disclosure of Kato, the high pullulan content liquid claimed herein is a product in a liquid form, and has a viscosity of 2.5 mm²/s or more for a pullulan concentration of 10% (w/w) when determined at 30°C on the Ubelode viscometer method. This pullulan product has a bacterial count of less than 300 cells/g product, a negativity with respect to coliform, a pH of 4.5 to 7.5, and a pullulan concentration of 20% (w/w) or more. The high pullulan liquid as claimed herein is defined by these properties. There is nothing in Kato that suggests a pullulan product with such properties. Again, it should be noted that pullulan in the culture medium in Kato's process is not a product but a so-called raw material that must be treated in various steps before it is made into a product that is commercially viable.

As shown in Table 1 at pages 16-17 of the specification as filed, the high pullulan content liquid as claimed herein, when allowed to stand at a temperature of 14°C, retains its original viscosity and pH, and retains

Appln. No. 10/535,256
Amd. dated March 5, 2007
Reply to Office Action of December 5, 2006

substantially its original coloration and turbidity for up to 13 weeks.

Accordingly, it is respectfully submitted that claims 1-15 are not obvious over Kato. Reconsideration and withdrawal of the rejection are respectfully solicited.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant

By: 

Anne M. Kornbau

Registration No. 25,884

AMK:srd
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\BN\S\SUMA\Kanbe3\pto\2007-03-05 AMD.doc